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A Letter of Mr. John Conyers, Citizen of London ; the Author of the Hygroscope described in Numb. 129 ; in which Letter is contained a Draught and Description of a very useful and cheap Pump, contrived by the said Mr. Conyers ; a Trial of which was also made at the Repairing of the New Canal of Fleet-river in London, and elsewhere.

SIR,

I Have here inclosed a Draught of a very useful and cheap Pump, which about the Year 1673. was by me contrived, and by my direction used and made at the New Canal of Fleet-river in *London* at the Work there, when the River was lately enlarged as now it is ; and this Pump was then found to empty and raise at least twice as much Water proportionably as those of the same or rather bigger bore, that were first made use of and cast by ; for, *this* being Taper or Conical all the way, and *those* Cylindrical, *this* would raise and cast out twice as much Water at least at one stroke, as the other Cylindrical ones would do with the same bore and strength. Now you may discern by the fashion, that, as there is no Brass or Lead work here, so it will be purchased at a cheaper rate than usual ; and as there is liberty in the motion, so there will be no wearing or rubbing upon the sides of the Bucket : Besides this, you may with the same ease by which you cast out of a cylindrical bore, cast out twice as much at least out of this : So that how useful this may prove for draining of Low grounds, Pitts, Mines, Fish-ponds, and for Shipping, Time and Experience must discover. This Engin was then recommended by Dr. *Francis Glisson*, as also by Dr. *Jonathan Goddard* to the *Royal Society*, whilst it was used in the Canal abovesaid.

Now this being the largest yet made about nine foot in length, and the smaller end or bottom-bore eight inches, and the top one foot eight inches bore, it was found to cast out at least eight Gallons at one stroke ; and this was a Bore of a squared fashion, being made of Planks nailed together, and Iron-hoops added to strengthen it on the outside ; which also in proportion may be made to what length or breadth you please. Now, though the Bore be large at the top, there is no more weight of water that lies on the bore at bottom, than just the breadth there ; the rest is born up by the sides, and the impulse of Water by that means is made in the water without grating against

gainst the sides of the Vessel ; and so with much greater ease and swiftness. The Water in the same time is raised through a smaller passage, to answer an enlarging capacity from the top to be vented according to that large provision for delivery ; and it shews, that Water moves easiest in Water, and requires a conical or tapering liberty throughout for its largest disbursement in quantity and ease in that motion, and the differing swiftness makes amends for the difference of the bore ; for it moves three times as fast through the smaller bore in the same time, in answer to the delivery of the larger bore at the top.

It is to be observed, that no strength is lost in this motion, the lateral rubbings being prevented thereby, and this being the most genuine figure for the largest quantity of fluids to move in, raising the Water sooner and with greatest ease.

Explanation of Figure I.

AA the body of the Pump, made of *Oak*, *Elm*, or *Deal*-planks ; with a valve at bottom *aa*.

BB the Bucket, in the midst of which there is a valve *b*, not visible in the Figure, being concealed by the sides of the Leather *bb*.

CCC the Iron to raise the Bucket.

DD the wood at the bottom of the Bucket containing the Valve.

EE the handle for raising the Bucket, to be managed by fewer hands than ordinary Pumps are ; which may be altered so as to employ a Horse, or Mill, or other such like way more advantageous than that of this handle, managed by the strength of Men.

FF a square taper-Box, with holes in the sides, and open at the bottom ; into the narrower part of which is inclosed the narrower end of the body of the Pump.

GG an additional Bucket of a larger dimension, to be placed in the Iron-work of the Pump about H, when it shall be needful to lengthen the Taper of your Pump, and thereby to raise the Water more forcibly to a greater height.

II the Spout of the Pump, to cast out the water of the same breadth with the side of the Pump, at the place represented by the Figure.

KK the Iron or Wooden-work set off, or bent back (if need be,) and placed at the back of this Pump for the easier and more capacious motion of the Pump-handle, in which it moves.

It may not be amiss to mention here, that this Pump, which was used at the said New Canal, was eight foot and a half long, and one foot eight inches broad at the top, and about eight inches broad at the bottom where it is inserted in the Box, and did cast out eight Gallons at a stroke, and twenty one strokes being made in one minute, there was delivered about 169 Gallons in a minutes time; whence 'tis easie to compute, what quantity is thrown out in an hour.

If it be asked, why the Pump and the Bucket is not of the same breadth throughout as high as the Bucket moveth? I answer, that it cannot be allowed of any other fashion than a tapering one, because that the celerity of the motion in the narrowest part of the Pump would thereby be obstructed in its supplying the delivery of the Water, which is thereby provided for the evacuation answering to the bigness of the uppermost broader part of the Pump.

Note, that this kind of Pump may by the same contrivance be made of a Tree bored through with a Taper-bore; and a Basket may be used at the bottom of the Pump instead of the Box-Colender.

Some Considerations of an observing person in the Country upon Numb. 133. of these Tracts, sent in a Letter to the Publisher of May 2, 1677.

SIR,

YOUR Tract of *Numb. 133.* is very pleasing for the great variety of good Arguments, some very curious, some very useful, all very considerable.

1. Your Preface is brief and modest. And never were noble Travellers better furnish'd with learned and accurate Instructions, and with exact and compleat Exemplars, as appears in several of your Breviates. In the *first* Volume you suggest some of the most remarkable *Inquiries* for many foreign Countries: You begin with Artificial Instruments, *N. 1. p. 31*; more particularly for the Sea, *N. 8. p. 148*, further explain'd *N. 24*; and with an Instrument for drawing any Object in perspective, *N. 45*. And now Mr. *Moxon*, Mr. *Seller*, Mr. *Green*, Mr. *Morden* and others are abundantly furnished with Sea-plots for all Navigations, Projections, Mathematical Books and Mathematical Instruments for all occasions of Travellers by Sea or Land. Neither *Anacharsis*, nor *Democritus*, *Pythagoras*, nor *Apollonius Thya-*

Fig. 1.

Fig. II.

